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ABSTRACT

Much research has focused on the question of whether phonological rules can and should be stated more appropriately in terms of the syllable than other units, notable segments and various boundaries. Formulation of rules without reference to the syllable obscures the motivation and unity of alternations. French has rules for consonant deletion preceding other consonants and in a phrase-final position which may be summarized: "Delete morpheme-final consonants in syllable-final position." The syllable-final position also affects assimilation, devoicing and neutralization of position of articulation. Syllable-final nasals cause nasalization of the preceding vowel; once again use of syllable boundaries allows simple statement of diverse processes. In French, the syllable-final, or weak, consonant assimilates to the following one. A theory of J. Hooper concerning syllabification on a universal basis is countered with evidence that rules that reposition syllable boundaries cannot be anywhere rules. The French rule of consonantal gemination and the tendency for open syllables support this contradiction. Resyllabification cannot precede the "loi de position"; it cannot therefore be an anywhere rule. Contradictions mentioned here do not completely invalidate the principles of syllabification, although the nature of certain types of resyllabification remains in doubt. (CHK)

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SYLLABIFICATION AND FRENCH PHONOLOGY

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A certain amount of current research has focused on the status of the syllable in phonological theory in an attempt to answer the question "Are there phonological rules that can be stated more appropriately in terms of the syllable than in terms of other units, notably segments and various boundaries?"[1] (excluding, of course, syllable boundaries). The question is not whether such rules can be stated with reference to either segments or syllable structure, but whether they should be.[2] Given the lack of syllable boundaries in current generative phonological representations, it is clear that rules can be and have been formulated without reference to the syllable. This is the case with all the rules of French under consideration here. I would like to claim that the formulation of these rules, while general and insightful to a certain extent, misses something. The formulation is not explanatorily adequate in that it obscures rather than emphasizes the motivation and unity of the alternations that are taking place.

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As is well-known, French has a phonological rule deleting consonants which precede other consonants provided a morpheme (or higher-ranked) boundary intervenes (see Schane, 1968). Thus,

(1) (a) morpheme-final

/ dɔrm + t# il /

Ø Consonant Deletion

[dɔrtil] dort-il 'is he sleeping'

(b) morpheme and word-final

/ pətit + z # garsɔn z /

Ø Ø Consonant Deletion

[pətigarsõ] petits garçons 'little boys'

Initially, then, the rule is:

(2) Consonant Deletion[3]

$C \longrightarrow \emptyset \ / \ ___ +C$

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As well, however, French has another rule deleting consonants, this time in phrase-final position:

(3) (il est) /pətit// /*

∅	Deletion
[pəti]	il est petit 'he is small'

/garson + z// /

õ	(Nasalization)
∅	Deletion
[garsõ]	garçons 'boys'

where the rule is given in (4):

(4) Phrase-final Consonant Deletion

$$C \longrightarrow \emptyset \; / \; ___ \; //$$

Given standard abbreviatory conventions, it is possible to collapse these two rules into one more general consonant deletion rule for French:

(5) Consonant Deletion[4]

$$C \longrightarrow \emptyset \; / \; ___ + \begin{Bmatrix} C \\ // \end{Bmatrix}$$

It is not immediately apparent what generalization is represented by the grouping {C, //} (aside from the absence of a following vowel, although this statement is ruled out because negative environments are not generally allowed in phonological rules). Yet this contextual statement is certainly not an uncommon one with respect to the functioning of phonological rules. When we consider, however, that these two environments require that the preceding consonant be in syllable-final position, the French rule becomes "Delete morpheme-final consonants in syllable-final position," and this formulation can be linked to an independently motivated characterization of syllable-final position as a weak position for consonants.[5]

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* where // represents phrase boundary

Many widespread and natural changes affect consonants syllable-finally but not syllable-initially, among the most common being deletion as exemplified by French, assimilation (see below), devoicing, and the neutralization of position of articulation.[6]

This influence of syllable-final position in French is not restricted just to consonant deletion. French also shows alternations between nasal vowels and sequences of oral vowel plus nasal consonant (see Schane, 1968, pp. 46-47):

(6)	fin	final	[ɛ̃]	[in]
	jardin	jardinier	[ɛ̃]	[in]
	brun	brunir	[œ̃]	[ün]
	parfum	parfumier	[œ̃]	[üm]
	plein	plénitude	[ɛ̃]	[en]
	vain	vanité	[ɛ̃]	[an]
	humain	humanité	[ɛ̃]	[an]
	roman	romaniste	[ɑ̃]	[an]
	plan	planer	[ɑ̃]	[an]
	ton	tonalité	[ɔ̃]	[ɔn]

Nasal consonants cause nasalization of the preceding vowel, and are themselves deleted when in word-final position. But nasalization occurs elsewhere in French as well, namely in preconsonantal position:

(7)	bonté	[bõte]	bonheur
	romantique	[romɑ̃tik]	romanesque
	genre	[žɑ̃r(ə)]	générique
	santé	[sɑ̃te]	saine
	vanter	[vɑ̃te]	vanité
	jointe	[žwɛ̃t(ə)]	joignons
	sonder	[sõde]	sonner

Here also we see the operation of a joint environment / ___ $\begin{cases} \# \\ C \end{cases}$ but again this statement misses the connection that it is syllable-final nasals that cause nasalization of the preceding vowel[7] and that subsequently delete, while syllable-initial nasals[8] remain: fi-nal, va-ni-té, etc. The use of syllable boundaries once again allows the simple and general statement of diverse processes in which the common factor is otherwise missing.

Syllable boundaries also play a role in the complex domain of voicing assimilation in French. Generally speaking, when two consonants are juxtaposed, one in syllable-final, one in syllable initial position, it is the syllable-final or weak consonant[9] that assimilates to the following one:

(8)	robe chic	[bš]
	état de choses	[dš]
	vague sentiment	[gs]
	la jeter	[žt]
	rose charmante	[zš]
	cette dame	[td]
	coupe de champagne	[pd]
	sac de cuivre	[kd]
	fausse dent	[sd]
	vache bête	[št]
	nous faisons	[fz]

This type of assimilation across syllable boundaries applies only to obstruents; sonorants in syllable final position remain voiced when followed by a voiceless segment:

(9)	valser	[ls]	'to walse'
	verser	[rs]	'to pour'

palefroi	[lf]	'palfry'
scalper	[lp]	'to scalp'
canneton	[nt]	'little duck'
bonne chose	[nš]	'good thing'
mannequin	[nk]	'mannequin'

For consonant clusters in syllable-initial position, moreover, it is necessary to distinguish voiceless obstruents as "strong" segments to which both voiced obstruents and sonorants assimilate in voicing:

(10)	cheval	[šy]	'horse'
	chemin	[šm̥]	'road'
	je sais	[žs]	'I know'
	prix	[pʀ]	'price'
	puis	[pɥ]	'then'
	pneu	[pn̥]	'tire'
	plu	[pl̥]	'pleased'
	quoi	[kw]	'what'
	pied	[pj]	'foot'
	soir	[sw]	'evening'
	fuir	[fɥ]	'to flee'

In word-final position, a different phenomenon from syllable-final assimilation appears to be taking place, since final sonorants preceded by a consonant devoice independent of the voicing of the preceding segment. Word-final position, in other words, is the dominant factor here:

(11)	rythme	[tm̥]	'rhythm'
	coffre	[fʀ]	'coffer'
	peuple	[pl̥]	'people'
	âpre	[ɑpʀ]	'bitter'
	le nôtre	[tʀ]	'ours'

sucre	[kʏ]	'sugar'
sable	[tl]	'sand'
sabre	[bʏ]	'saber'
seigle	[ɑl]	'rye'
givre	[vʏ]	'hoar-frost'
chambre	[bʏ]	'room'
dogme	[ɑm]	'dogma'

where, as is evident from the latter examples, final sonorants may be devoiced even if a voiced segment precedes. Malmberg (1969) explains this as assimilation to the voicelessness of the following pause, but this remains to be fully demonstrated. As we have seen, however, the role played by syllable boundaries is clearly an important one in the functioning of French phonology. Consonant deletion, nasalization, and assimilation are all crucially conditioned by aspects of syllable structure.

In order that this use of syllable boundaries may have general significance, however, there must be a principled way of determining the insertion of syllable boundaries into phonological representations, on either a universal or a language-specific basis (or a combination of both). We will do no more than outline certain syllabification principles here, following recent proposals, and will point out some of the problems French poses for these suggestions.

In an interesting paper, Hooper (1972) outlines a tentative set of rules for distributing syllable boundaries on a universal basis. The aspects of her proposal with which we are concerned involve the following sequences (where $ stands for syllable boundary, and C V L G for consonant, vowel, liquid, glide respectively):

(12) (a) V C V ⟶ V $ C V

(b) $V\begin{bmatrix} C \\ -son \end{bmatrix}\begin{bmatrix} C \\ -son \end{bmatrix}V \longrightarrow V\ C\ \$\ C\ V$

(c) V C L V ⟶ V $ C L V

(d) V C C L V ⟶ V C $ C L V

(e) V C G V ⟶ V $ C G V

(f) $ is inserted at all word boundaries

Hooper points out in addition several possible exceptions to these principles, and also that the position of $ at certain word boundaries and elsewhere may be altered in the course of derivations to become more in line with the general principles, which strongly favour a universal tendency of open syllabification. According to these principles, these French words are syllabified as follows:

(13) été [e$te] 'summer'

actif [ak$tif] 'active'

écrire [e$krir] 'to write'

actrice [ak$tris] 'actress'

devient [də$vjɛ̃] 'he becomes'

Hooper, along with Vennemann(1972), also proposes that the rules of syllabification are not restricted to apply either just to underlying forms or just to surface forms, but that they apply at the underlying level and also after each stage in the derivation: "syllabification rules are persistent rules...i.e. anywhere rules: After each step in a derivation, the string is checked against the syllabification rules, and resyllabification occurs if there is a conflict" (Vennemann, 1972, p. 16). Syllable boundaries are inserted into underlying representations by means of the general principles outlined above, and are altered in the course of a derivation. The syllable boundaries associated with word boundaries are particularly subject to subsequent repositioning. Interestingly enough, while French shows general agreement with the principles outlined above, particularly in its well-known tendency toward open syllabification, it also provides a number of counter-examples.

If syllable boundaries are inserted in underlying representations at every word boundary, for example, they cannot be immediately readjusted on the basis of these general principles. The boundaries cannot be moved until after the application of stress placement and jod formation at least, since these rules must precede truncation, and the repositioning of syllable boundaries cannot precede truncation (see Schane, 1968, ch. 3). Consider the representation of petit rabin 'little rabbi':

(14) /#pətit # rabɛ̃#/

$pə$titrabɛ̃#[10] syllabification of underlying representation (UR)

Now if the boundary ($) inserted between the two words were moved either immediately, or following stress assignment, but before truncation, to a position preceding the final /t/ of petit to give the normal French sequence of V$trV, we would obtain the wrong result in our derivation. Consonant deletion (truncation in Schane, 1968), which affects consonants in syllable-final position, must apply before this repositioning in order to give the correct output:

(15) /#pətit # rabɛ̃#/

$pə$titrabɛ̃$ syllabification of UR

∅ consonant deletion

---------- resyllabification

[pətirabɛ̃]

The opposite order, repositioning and then truncation, gives the wrong result:

(16) /#pətit # rabɛ̃#/

$pə$titrabɛ̃$ syllabification of UR

$pə$titrabɛ̃$ resyllabification

---------- consonant deletion

*[pətitrabɛ̃]

Interpreted in a strict sense, then, rules which reposition syllable boundaries cannot be anywhere rules. But there is more evidence from French to show this as well, connected with the behavior of liaison consonants. According to Malmberg (1944) who cites M. Durand, there is a difference in syllabification between petit orage 'little storm' and petite orange 'little orange', the former being [pəti$tɔra:ʒ], the latter [pətit$ɔrɑ̃:ʒ].[11] Any analysis of French which recognizes an underlying final /t/ in petit would, if only phonological criteria were used, have to syllabify these forms as:

(17)	/pətit # ɔraʒ/
syllabification	pə$tɪt $ ɔ$raʒ
schwa deletion	----------
resyllabification	pətitɔ$raʒ
	/pətit+ə # ɔrɑ̃ʒ/
syllabification	pətitə $ ɔ$rɑ̃ʒ
schwa deletion	ø
resyllabification	pətitɔ$rɑ̃ʒ

with both of the word-final segments /t/ ending up as syllable-initial. It cannot be the word boundary that conditions the difference, because the position is the same in both cases. It cannot be the general (re-)syllabification conventions, because they would give the wrong result, syllabifying petite orange as *[pətitɔ$rɑ̃ʒ]. It cannot be the general French tendency toward open syllabification because here even this tendency is contradicted to give a closed syllable in [pətit$ɔrɑ̃ʒ]. It appears that there is a difference in syllabification depending on whether the consonant is normally pronounced (petite) or normally silent but realised in liaison (pətit). Yet this distinction is nowhere indicated in the underlying representations of the consonants themselves. How to account for the differing effects liaison versus non-liaison consonants have on syllabification

(and also on the surrounding vowels according to the data discussed by Taylor, see note 10); that is, how to distinguish formally between the different types of consonants (aside from the ad hoc device of simply having two classes of final consonants) remains a difficult problem given current phonological theory. The corresponding prose statement, on the other hand, seems reasonably straightforward.

There is a further problem with the syllabification rules in French, again bearing on the anywhere or recurrent nature of these rules. French has, associated with its "accent d'insistance", a rule of consonantal gemination. This rule, conditioned by emotional or effective speech, may optionally double the first consonant of a word. Thus normal [mãsõ:ž], mensonge 'lie' could be pronounced [mmãsõ:ž] under the "accent d'insistance", and épouvantable 'horrible' immense 'huge', c'est terrible 'it's horrible', and so on, could be pronounced [eppuvãtabl], [immãs], [sɛtteribl] respectively. The difficulty is that French phoneticians are generally agreed (see Malmberg, 1956) that the syllable division in words of this type is before the geminate, not in the middle of it: [e$ppuvãtabl], [i$mmãs], [sɛ$tteribl], but according to the principles outlined above, the phonetic syllable division should be VC$CV, between the two consonants. Resyllabification must therefore be blocked from applying after expressive gemination, and cannot as a consequence be an anywhere rule in French.

It is possible to relate this exceptional behavior of the syllabification of derived geminates in French to the strong tendency of French for open syllables. The tendency may be so strong that it over-rides the general principle of dividing VCCV sequences between the two consonants.[12] Moreover, it is not just these derived geminates that contradict the principle. Other intervocalic obstruent clusters may also exceptionally remain syllable-initial (see Gougenheim, 1935, p. 95; Valdman et al, 1970, p. 290). According to these authors, actif may be syllabified a$ktif, astre as a$str, amener as a$mne, acheter as a$šte, la petite as la$ptit, technique as te$knik, ca-

omnie as ka$lɔ$mni, and so on,[13] in direct violation of principle (12b) above and produced in all probability by the same powerful tendency toward open syllables.[14] Not all of these examples are unambiguous or uncontroversial, however, and they will be considered further in a moment. Assuming something of this nature is taking place in some of the examples, they show that in certain cases the principles of syllabification have failed to apply to bring representations in line with the expected segmentation. It is also possible to show in other cases where syllable boundaries have been moved from positions in ways which violate the constraints. Consider the phrases *à cheval* 'on horseback', *un cheveu* 'a hair'. The underlying representations of these forms would presumably be syllabified as follows:

(18) /a $ šə $ val/ /œ̃ $ šo $ vö/

In standard informal speech, where the schwa will be deleted, there are two possibilities for resyllabification following this deletion: [aš$val] in line with principle (12b) above, or [a$šval]. In fact, in Standard French the first alternative is never chosen, for if it were, the regular assimilation of syllable-final consonants would apply, and the output would be *[aʒval], parallel to *prends ce vin* 'take this wine' [prazvɛ̃].[15] The sequence is resyllabified, in other words, so that the boundary precedes the consonant cluster rather than dividing it, contrary to expectations. The conclusion is then, that just as differences in syllabification constitute possible dialect differences (Vennemann, 1972), forms may also be exceptional with respect to syllabification processes, just as they may be to other phonological processes.

There is a more general problem, mentioned above, with respect to examples like *technique* and *omnivore* and their implications for the anywhere nature of resyllabification. In fact, contrary to Gougenheim and Valdman *et al*, the syllabification of these forms as [tɛ$knik] and [ɔ$mni$vɔr] is highly suspect. If the "loi de position" in French, whereby mid vowels in open syllables tend to have a closer articulation,

is at all productive (as it certainly seems to be) there should be a tendency toward a pronunciation [tɛ$knik] or [ɔ$mni$vɔr] because of the open syllable. Since this does not happen, the syllabification is more likely [tɛk$nik] and [ɔm$ni$vɔr] in line with the general principle. But the "loi de position" is very closely tied to another phenomenon of French, that of "enchaînement". This latter is one important aspect of resyllabification in French, where the final consonant of one word becomes the initial consonant of the following word if that word begins with a vowel. The difficulty is that"enchaînement" (i.e. resyllabification) can never precede the "loi de position" because if it did, it would create environments where this latter rule would incorrectly apply. We always have, for example, [ɛ$lɛvnu] elle est venue, or [fɛ$tatãsjõ] faites attention after the operation of "enchaînement", never *[ɛlɛvnu] or *[fɛtatãsjõ]. Resyllabification, therefore, cannot precede the "loi de position" and cannot be an anywhere rule. This seems to indicate that there is a fundamental difference between resyllabification as it applies to underlying, or to derived but still quite abstract, forms and the phonetically influenced adjustements that take place in conjunction with certain well-known rules of French (the "accent d'insistance," liaison, "enchaînement" and the "loi de position", and so on). This difference between phonological and phonetic syllabification may correlate with the difference between universal and language-specific characteristics allowed for by Hooper (1972, p. 536), but much more work is needed to refine this latter distinction.

What conclusions do the preceding examples (or counter-examples) motivate? They do not, I would maintain, completely invalidate the principles of syllabification outlined in (12) above, although the nature of certain types of resyllabification remains in doubt. Hooper's proposals seem to constitute the unmarked manner of syllable division, and retain a favoured status. What is interesting is the way certain other considerations may interact with and over-rule these general tendencies: the strong pressure to open syllables in French allowing for V$CCV divisions,[16] the emotive "accent d'insistance" yielding syllable-initial geminates, and in certain in-

stances the difference between latent liaison consonants and "full" consonants leading to VC$V syllabification. This serves to reinforce Hooper's contention that the definition of the syllable "should be taken as a first approximation" and that there "are still fundamental questions that lack conclusive answers."

NOTES:

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[1]See, for example, Anderson (1969), Fudge (1969), Hooper (1972), Vennemann (1972).

[2]But see Hooper (1972) for certain processes that cannot be properly stated without reference to syllable boundaries.

[3]This rule as presently formulated will not handle the deletion of the final consonant in garçons. We return to this presently. It is also assumed, not without certain problems, that any higher boundary also counts as an occurrence of + (morpheme boundary), and therefore does not have to be specifically indicated. That is, any word boundary is also a morpheme boundary by definition.

[4]We thus follow Schane's reanalysis (personal communication) in collapsing the two consonant deletion rules into one more general consonant rule, rather than consonant deletion and vowel elision into a general truncation rule. As it stands, there is still something wrong with the notation for this rule, since the // (phrase boundary) should include the lower + automatically (see note 3 above). There is no need to include the + if the rule applies to phrase-final consonants. The notational conventions cannot capture this, however. Needless to say, numerous exceptions have to be specified to the rule of consonant deletion, so many so that it may be incorrect to attempt a phonologically oriented solution at all, particularly when the complexities of liaison are considered.

[5]This concept of weak position allows the resolution of a certain arbitrary characteristic of degemination rules, namely which of the two identical consonants C_i C_i deletes. It is the first one which deletes, since it is in the weak, syllable-final position.

[6]Devoicing is well-known from German; see Vennemann (1972). Neutralization is exemplified in Old French, where [m n and ñ] occur medially, but only [n] word-finally. While syllable-final position is weak for conson-

ants, unstressed position is weak for vowels, as indicated by the widespread deletion, reduction, or neutralization that affects unstressed vowels.

[7]Nasalization in this respect is different from consonant deletion, in that it affects segments morpheme-internally: vend + ons 'we sell', fond 'depth', etc. (unless sequences of VNC are not permitted in our underlying representations morpheme-internally, the representations having a more concrete underlying nasal vowel). Consonant deletion, on the other hand, applies only at morpheme boundaries.

[8]With mon ami [mɔ̃nami] 'my friend', un ami [œ̃nami] 'a friend', and so on, being exceptions to this generalization.

[9]For examples, see Malmberg (1969, p. 132). Subscript ̥ represents devoicing of voiced segments, ̬ represents voicing of original voiceless segments.

[10]The word-boundary between these words (and elsewhere) is not deleted when syllabification takes place. It must still be available on semantic grounds, at least. But as far as phonological conditioning is concerned, it is the syllable boundary that is the relevant factor.

[11]Parallel differences in liaison consonants versus "regular" final consonants, also possibly due to differences in syllabification, are reported in Taylor (1965), who shows differences in the segment [z] and in its effects on surrounding vowels in pairs like des astres 'some stars', and désastre 'disaster'. The influence of the orthography cannot be ruled out either.

[12]There is an alternate explanation, namely that the 'accent d'insistance' affects syllables as a whole rather than individual segments. As a syllabic phenomenon it cannot pass beyond the limits of the individual syllable it affects. The division $CC, then, has nothing to do with open syllabification, but is instead an accentual phenomenon.

[13] In the absence of these examples, it would be possible to claim that geminate consonants under the 'accent d'insistance' are represented as single long segments instead of as sequences of CC, with the syllable division occurring normally before the single [+long] consonant. But given the latter examples, it is clear that we are dealing with a more general characteristic of French.

[14] Principle (12a) may also be violated with some frequency according to Malmberg (1956) who notes that "dans beaucoup de langues la frontière syllabique est un phénomène phonologique dont il serait vain de nier l'existence. Il y a en effet des langues qui opposent un groupe A/PA à un groupe AP/A de sens différent." But he also notes that "en termes phonologiques, on pourrait caractériser...le type implosif comme marqué, par rapport au type explosif plus général (non-marqué)." (pp. 36-37)

[15] The first alternative is chosen in other dialects, however, and was presumably the source of the well-known Canadian French forms joual [ʒwal] 'horse' and cheville [ʒwij] 'ankle'.

[16] Although this tendency is also overridden in many cases, where schwa deletion produces complex clusters and closed syllables (as in la petite [laptit]. The interaction between the tendancy for open syllables, the deletion of schwa, the simplification of consonant clusters, and the 'loi de position' is very complex, and requires further investigation.

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